



Natural Built Social Environment Health

ISSN 3085-461X

www.nbseh.org



Water Flow in the Tigris-Euphrates Basin: Challenges to Long-Term Solutions Under State Sovereignty, Political Instability, And Climate Change Uncertainties

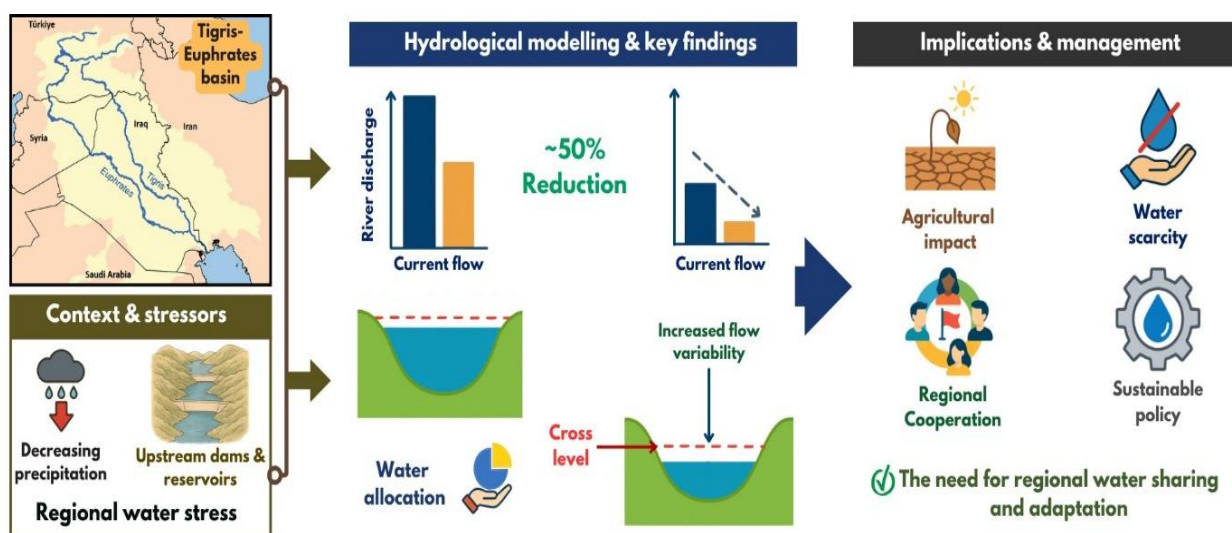
Salam Abdulqadir Abdulrahman *

College of Law and Politics, University of Human Development , Sulaymaniyah 46001, Iraq

***Corresponding author:** Salam Abdulqadir Abdulrahman ; **Email address:** salam.abdulrahman@uhd.edu.iq; salam.abdulrahman@gmail.com, **Phone:** +964-750-307-3111

Graphical Abstract

The Tigris and Euphrates are the Middle East longest permanent rivers, shared among Türkiye, Iraq, and Syria. Challenges to the natural flow of these waters include state sovereignty amid international anarchy, political instability, and climate change. Recognizing the historical rights of each state and focusing on temporary bilateral agreements among these states is an appropriate approach to sharing the water.



DOI: [10.63095/NBSEH.25.556022](https://doi.org/10.63095/NBSEH.25.556022)

Received: 27 April 2026

Revised: 16 May 2026

Accepted: 16 May 226

Published online: 06 June 2026

Citation: Abdulrahman, S. A., 2026, Water flow in the Tigris-Euphrates basin: challenges to long-term solutions under state sovereignty, political instability, and climate change uncertainties, *Natural Built Social Environment Health* 2(3), 18-36. www.doi.org/10.63095/NBSEH.25.556022

Abstract: The Tigris and Euphrates rivers and their tributaries are the lifeline of Iraq and parts of Syria, and they are significant water resources in Türkiye and Iran. Iraq is known in historical texts as the land between two rivers, or Mesopotamia, which illustrates the importance of the rivers to this country. Recent hydraulic structures in upstream states, along with climate change factors, have caused interruptions to the flow of the rivers and reduced their waters, thereby creating a huge water deficit in downstream Iraq. This paper reviews the profound significance of the rivers for Iraq. It argues that state sovereignty, political instability, and increasing fluctuations in precipitation because of climate change pose considerable challenges to the natural flow of the rivers, making short-term bilateral solutions more practical.

Keywords: Tigris, Euphrates, Uncertainties, Temporary solution, Iraq.

Introduction

The Tigris and Euphrates are the longest permanent rivers, with their entire catchment basins located in the Middle East. The rivers and their tributaries are shared by Türkiye, Iran, Iraq, and Syria. They flow mainly in southeastern Türkiye: the Tigris enters Iraq from the north and is joined by several important tributaries coming from Türkiye and Iran, and the Euphrates flows through the eastern areas of Syria before entering Iraq. The two rivers get close to each other near Baghdad and continue through the lowlands in southern Iraq where they merge, forming the Shatt al-Arab River, which flows for about 200 kilometres before it empties into the Persian Gulf. The Tigris and Euphrates, along with their tributaries, are significant water sources in Türkiye's southeastern and Iran's northwestern areas, and they are the lifeline for Iraq. Syria's eastern areas also rely heavily on the Euphrates' waters. Ancient Iraq was called Mesopotamia, which means 'the land between two rivers', or referred to as the 'black land', indicating the fertility of its soil for agriculture. It was also known as 'The Fertile Crescent'. It is safe to say that life and human civilization would not have been possible in most parts of Iraq without the Tigris and Euphrates.

The natural flow of the Tigris and Euphrates rivers faces problems from three sources: the power and rights exercised under state sovereignty; conflicts between the riparian states; and climate change, which causes significant changes in precipitation patterns. State sovereignty amid international anarchy means, in the context of this paper, that Türkiye and Iran claim ownership over the waters and feel unrestricted in how they use the waters that flow in their territories, and how much water they store or release to downstream states. Türkiye and Iran are unrestrained by international treaties on transboundary watercourses, and international anarchy is often used by states to bypass their international obligations. Political instability entails tensions and conflicts between the rivers' riparian states that impact their inter-dynamics and relations. The four riparian states covered in this paper have had volatile and troubling relationships in the past decades; for example, Türkiye was once on the verge of invading Syria over the latter's refusal to hand over the leader of a rebel group. Climate change means that rainfall and snowfall, which constitute the sources of the Tigris and Euphrates, are more unpredictable than before; there is generally less rain and snow, and the Middle East is getting drier. This reduction of rain and snow can be used by upstream states to justify their water policies.

Following the introduction, there are four other parts and the conclusion. Part II reviews the transboundary Tigris and Euphrates rivers and their importance to the riparian states, focusing on Iraq since it is the most vulnerable state to changes in the water flows in the basin. Part III studies the issue of state sovereignty under international anarchy and what it means for controlling the

waters. Part IV surveys political tensions and conflicts between the riparian states. Part V reviews the impacts of climate change on the riparian states. The conclusion suggests that these factors make short-term bilateral solutions more practical than long-term multilateral solutions for the flow of the rivers. The main question this paper attempts to answer is: what challenges do state sovereignty, political instability, and climate change uncertainties pose to the flow of the Tigris and Euphrates rivers?

Part II: The Tigris and Euphrates basins: Türkiye, Iran, Iraq and Syria

Cradled entirely within the Middle East, the Tigris and Euphrates hold the distinction of being the region's longest permanent rivers: Türkiye, Iran, Iraq, and Syria. The rivers served as vital conduits for the development and sustenance of ancient civilizations in the Mesopotamian plain, in modern Iraq, such as Sumerian, Ubaid, Akkadian, Babylonian, Seleucid, Sasanian, and, later, Islamic and Ottoman. Irrigated agriculture and a system of natural and artificial water canals facilitated food production, mainly grains, and transportation, which stimulated invention, innovation, and development in many other sectors. The rivers are extremely vital for Iraq. They provide freshwater for domestic use, agriculture, industry, and recreational purposes. Iraq was rich in water resources from the two rivers until a few decades ago when Türkiye, as well as Iran and Syria, began building dams on the sources of the rivers. Iraq experiences a huge water shortage almost every year and is close to being characterized as a country with acute water scarcity [1,2].



Figure 1. The Tigris and Euphrates rivers and their catchment areas
<https://archeorient.hypotheses.org/36681>

The Tigris and Euphrates headquarters are located in the Taurus Mountains in southeastern Türkiye, where a considerable amount of rain and snow falls annually. The rivers take separate paths toward the south of the country; the Tigris enters Iraq at the town of Fiesh Khabur, and the Euphrates enters Syria at the city of Jarablus, then crosses the Iraqi border at the town of al-Qaim. The rivers get close to each other in the vicinity of Baghdad but remain separate and flow through central Iraq. They finally converge near the city of Al-Qurnah, where they form the Shatt al-Arab, which eventually flows into the Persian Gulf.

The Tigris waters increase in Iraq because of significant tributaries that originate in southwest Iran and the Kurdistan Region of Iraq. The Euphrates only loses water in Iraq, as it is not joined by any

tributaries. The Tigris runs for about 1,800 km and the Euphrates for 2,780 km to 3,000 km; the two rivers' basins cover an area of about 917,103 square km, located in Iraq, Türkiye, Iran, Syria, and Saudi Arabia. The estimated annual discharge of the Tigris is about 52 billion cubic metres (BCM), and the Euphrates is 32 BCM, with Türkiye being the main contributor to their waters among the riparian countries, which also include Iran, Iraq, and Syria. Both rivers' annual flow fluctuates significantly from one year to another and from one season to another; it is usually high in March and April and low in September and October. Generally, since the construction of hydraulic structures in upstream states combined with the impacts of climate change, the rivers' flow has drastically decreased [3].

The Tigris River originates in the highlands of Hazar Lake in Türkiye, surrounded by the Taurus Mountain chain. Its length inside Türkiye is approximately 400 km before it reaches the Iraq-Syria border. The river is shared between Türkiye and Iraq; but, its catchment basin includes Iran and Syria as well. Türkiye contributes 51% of the Tigris River's annual water volume through its water resources, which include three main tributaries: Batman, Garzan, and Botan, as well as the Greater Zab River (also called Upper Zab), which first flows into Iraq, where it receives water from other tributaries before it joins the Tigris. The volume of water generated for the Tigris within Türkiye is between 18 and 21 BCM. About 21% of the length of the Tigris lies in Türkiye; the rest is in Iraq, approximately 1,418 km. Besides the Greater Zab, three other tributaries join the Tigris inside Iraq: Khabur, Lesser Zab (also known as Lower Zab), and Diyala (known as Sirwan in the Kurdish areas of Iraq), which add another 25 to 29 BCM to the river [4,5].

The Euphrates River originates near Mount Ararat, close to Lake Van, and is joined by two significant tributaries: the Murat-Su and the Kara-Su (or Frat-Su), which, in effect, constitute the majority of the river's water. The volume of water generated for the Euphrates within Türkiye is between 31 and 32 BCM. The river runs through Türkiye for approximately 1,230 km. Within Syria, the Euphrates receives a small amount of water from two tributaries: the Balikh and the Khabur rivers. Syria contributes about 10% to the Euphrates River, which flows through the eastern part of the country for approximately 710 km. The river's length in Iraq, where it receives no tributaries, is approximately 1,060 km. The catchment basin of the Euphrates includes Saudi Arabia as well. The total annual discharge of both the Tigris and Euphrates is approximately 84 BCM. This amount fluctuates greatly depending on the needs of upstream states, especially since the dams can hold a significant amount of water, as well as annual precipitation [2,6].

There are many dams built upstream in Türkiye on the Tigris and Euphrates rivers as part of the ambitious Southeastern Anatolia Project, known by its Turkish acronym, GAP. On the Tigris and

its tributaries, there are Ilisu Dam, which is the largest with a storage capacity of 10.4 BCM; Dicle Dam; Kralkızı Dam; Cizre Dam; Batman Dam; Alkumru Dam; Silvan Dam; Garzan Dam; Çetin Dam; Devegeçidi Dam; Silopi Dam; Göksu Dam; and Hacıhıdır Dam. On the Euphrates and its tributaries, there are Atatürk Dam, which is the largest with a storage capacity of 48.7 BCM; Keban Dam; Karakaya Dam; Birecik Dam; Karkamış Dam; Bağıştaş I & II Dams; Sırımtaş Dam; Hancağız; Kayacık; and Çamgazi Dams. The Euphrates River flow is also retained at several dams in Syria before it enters Iraq. The largest and most significant is the Tabqa Dam, with a storage capacity of 11.7 to 14.1 BCM. There are also Tishrin Dam; Baath Dam (also known as the Mansoura Dam); Halabiye Dam; and Khabur River tributary [7]. These dams have a great impact on Iraq as a downstream state. They constitute a real threat to the flow of the rivers to Iraq. There are many dams on the Tigris and Euphrates rivers and their tributaries in Iraq too; but, they are not significant in the sense of constituting a threat to another downstream state since Iraq is the last downstream state on the rivers.

There are dams inside Iran built on the main tributaries that flow to Iraq and join the Tigris River. On the Lesser Zab (also called Little Zab and Lower Zab), there is Zardasht Dam, which is the largest and has a storage capacity of 380 to 387 million cubic metres (MCM); Silveh Dam; and Kani Sib Dam (also called Kani Siv or Kani Sew). There are many dams and tunnels on the Sirwan River in Iran as part of the ambitious Tropical Water Project (TWP). Daryan Dam, which is the largest with a storage capacity of 316.3 MCM, feeds the Nowsud Water Conveyance Tunnel, which transfers water to other parts of Iran. There are also Garan Dam; Gawshan Dam; Azad Dam; Zhavveh Dam; Herwi Dam; and several other smaller dams [8-12]. Dams in the upstream states are a curse for Iraq; they deny Iraq its due share of the waters, but they can also be a blessing if upstream states cooperate with Iraq.

Iraq is heavily reliant on the waters of the Tigris and Euphrates rivers, which provide 90% to 98% of the country's surface water. The rivers and their tributaries are the primary sources for drinking water, domestic use, irrigation, industrial and energy use, and recreational activities in a country that is largely arid (except for its north and northeast), also known as the Kurdistan Region of Iraq, and rain is scarce in its western and southern parts. Iraq's rapidly growing population, which is now close to 50 million, is increasingly vulnerable to any changes that occur in the flow of the waters. All the riparian states need to understand this difficult situation and work together, bilaterally, as we argue, to help mitigate the impact of climate change and ensure that the waters do not face continuing disruption to downstream states [13].

Part III: State sovereignty

State sovereignty is problematic for the natural flow of transboundary rivers. The modern nation-state exercises power over a defined territory and population and rejects outside interference. The sovereign rights inherited from the Peace of Westphalia in 1648 and enshrined in the United Nations Charter in 1945 allow internationally recognized modern nation-states to hold exclusive power within their defined borders, including the management of the natural resources, such as water. The world is divided along borders, creating nearly 200 nation-states, big and small, with their own separate governments, distinctive jurisdictions, and political institutions. There are hierarchies and order within a state. Outside a state, there is no such thing; there is anarchy [14-16].

International anarchy refers to a system in which the nation-state is the highest authority to make decisions and enforce laws within its borders. There is no global central sovereign authority that can impose laws on nation-states or make decisions for them. The sovereign nations see themselves as equal in terms of having legitimate power within their territories, viewing no authority above themselves and negotiating on equal footing when trying to resolve disputes that occur between them. This situation emboldens upstream states to behave independently on the international watercourses [17].

The problem is that, similar to individuals, states are self-interested and that survival and dominance are essentially the driving forces behind their behaviour in international relations. States seek survival when situations are difficult for them. A state's priority is to endure the difficult phase, no matter how long. Then, when things get easier and the pressure is reduced, states seek dominance and control; they attempt to dominate and overpower other states and influence their affairs if they can. This is human nature according to realism, which is the mainstream school of International Relations (IR), and it is reflected in states' behaviour, which exhibits the human survival instinct. Both survival and dominance tendencies work against the natural flows of international watercourses [18].

During the survival period, and because of the rising demand for water, drought, etc., the upstream state may prioritize its own needs and use the water for irrigation, domestic use, and various other activities. During the dominance period, the upstream state uses the water as leverage against the downstream state to obtain concessions and make it respond to its demands, which can be political, economic, or of any other type. These behaviours are made possible by sovereign rights exercised in the absence of a global central authority and a lack of any global institutions with the power to check states' behaviours and hold them accountable for their actions. Morality, ethics, and the

Christian principle 'love your neighbour as yourself' are not enough to prevent a state from harming another state [19,20].

Power plays an important role in international relations. Military capabilities, whether a state possesses them or allies itself with states that possess them, can strengthen a state's position regarding the flow of international rivers and other issues related to its foreign policy and international relations. Downstream states can use their military power to threaten upstream states to release water or not block the flow of water in the first place. Economic and diplomatic power can similarly bolster the position of a state. For a long time, Egypt prevented Ethiopia and other upstream states from building dams and water projects on the Nile River, receiving the lion's share of the Nile waters. But power changes, and so do the abilities of a state to secure its waters flowing in its territories or coming from foreign territories. Egypt could not stop Ethiopia from building the Grand Ethiopian Renaissance Dam after years of success in retaining the majority of the Nile waters for itself. Power can be more dangerous when it is in the hands of upstream states, as they are already in a stronger position because of the location of the river's sources [21].

Sovereignty under international anarchy allows states to evade their international obligations. States tend not to fear the consequences of their actions, as the global institutions that impose international laws and obligations either do not exist or are weak and unwilling or unable to impose sanctions or punish the breaching states. States that are not signatories to international treaties can more easily evade their responsibilities. Türkiye and Iran, both upstream states to Iraq, are not signatories of the 1997 United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses; hence, they take no responsibility to follow the provisions of the treaty. Moreover, both Türkiye and Iran are militarily and economically stronger than Iraq. This puts Iraq in an unfavourable position concerning its share of the Tigris and Euphrates waters [22-24].

The contemporary international political system does not help downstream states secure a fair share of water from international watercourses. The system, which consists of independent, sovereign nation-states, allows upstream states to treat downstream states unfairly and leaves downstream states with few options to rectify the injustice. Injustice and unfair treatment by some states against others will continue as long as anarchy exists. According to the school of realism, international anarchy is a permanent feature of international relations [25,26].

Part IV: Political instability

Instability is a defining characteristic of interstate relations in the Middle East. The Middle Eastern states do not have stable relations with one another because of historical rivalries, conflicting interests, ideological differences, and their competition for approval and favour by powerful states

outside their region. The countries' rulers lack popular legitimacy and usually rely on outside powers for protection. Moreover, outside powers' economic interests in oil and gas, as well as their geopolitical interests, often work against political stability. In fact, the very instability is beneficial for them in the sense that it makes their presence necessary and leads to profitable arms deals, security, and other agreements [27].

The riparian states of the Tigris and Euphrates rivers have had conflicts and rivalries in the recent past, with implications for their wider relations, including cooperation over the shared waterways. The four riparian states have also experienced periods of good relations; examples include the rapid improvement of relations between Iran and Iraq following the overthrow of the Sunni-oriented Iraqi regime under Saddam Hussein in 2003 and the formation of a Shia-majority government in Iraq, which aligned with Iran's state ideology. Another example is the rise to power of a Sunni and pro-Turkish militia group in Syria in 2024, which improved relations with Türkiye. Normally, these changes would not lead to long-term institutional relations or provide enduring stability. The general trend of relations between these countries is instability [28].

Türkiye and Syria, the former being upstream on the Euphrates River relative to the latter, have experienced years of bad relations in the twentieth and twenty-first centuries. Syria has been a major security concern for Türkiye. This became more apparent following the 2011 uprising in Syria, for which Türkiye showed its greatest support. Türkiye backed the opposition forces, became a safe haven for the opposition groups, trained them, funded them, and declared that the Syrian regime must go. Prior to the uprising, the two states had major disagreements regarding border issues, water rights, and divergent foreign policies. Following the uprising and the formation of Kurdish groups linked to armed opposition groups, Türkiye intervened militarily in northern Syria and controlled a long strip across the border. It is difficult to say that both states can cooperate long-term, knowing that the present Türkiye-Syria relations are largely person-to-person and party-to-party. If the Turkish ruling party, the Justice and Development Party, loses power, or President Recep Tayyip Erdoğan is gone, or if power changes hands in Syria, the recent improvement in their relations may vanish quickly [29-31].

On the Euphrates line and regarding Syria and Iraq: their relations have been characterized by bitter and enduring conflicts since the seizure of power by the rival branches of the Baath Party in both countries in 1963. The leaders of the ruling Baath Party, Hafez al-Assad in Syria and Saddam Hussein in Iraq, had ideological differences and personal power struggles, competing with each other for domination in affairs concerning the Arab nation. There were several assassinations attempts against the Baath leaders in both countries, which often led to accusations and threats of

retaliation. Syria supported Iran in its eight-year war against Iraq from 1980 to 1988, creating problems for Iraq's oil exportation and the flow of Euphrates waters to Iraq. Iraq backed Syrian opposition groups and supported coup d'état attempts in Syria. Relations slightly improved following the fall of Saddam Hussein in 2003 and the rise of Shia Muslims to power in Iraq. The Assad family in Syria were Alawites, which is a minority Shia group. But, the Kurdish political movements and security became serious issues between the two states. The fall of Bashar al-Assad in 2024 and the rise to power of Ahmed al-Sharaa, formerly known as Abu Mohammad al-Julani, has initiated another tense phase in Syrian-Iraqi relations. Al-Sharaa is recognized by Iraq as a terrorist, and there are serious charges pending against him. New ideological differences, as well as political, security, and economic issues, all exist with no horizon for resolution soon [32,33].

Türkiye and Iraq's relations, as the two riparian states of the Tigris River, have been partially cooperative and largely contentious, with major issues centred on land disputes. This is embodied in Türkiye arguing that it should have sovereign rights over the entire Mosul Wilayat, which constitutes about one-third of total Iraq's land, as well as on security and water resources. For many years, Iraq's Kurdistan Region mountains in the northeast of the country have been home to Kurdish guerrilla groups fighting the Turkish state over the political rights of the Kurds in Türkiye. Türkiye has supported the Iraqi Kurds on many occasions and in many respects, which has in effect weakened the political and economic powers of the Iraqi central government. The lack of cooperation was also the result of Türkiye's political orientation for most of its contemporary history. The modern Turkish state, officially known as the Republic of Turkey, founded in 1923 (the country's name changed to Türkiye in 2022), under the legendary leader Mustafa Kemal Atatürk and other subsequent governments until the coming to power of the Justice and Development Party (known by its Turkish acronym AKP or Ak Parti) in 2002, was more Western-looking and largely ignored its ties with the Muslim world. This has negatively impacted its relations with Muslim countries, including Iraq. Despite the change in attitude and foreign policy of Türkiye under AKP, Iraq's political and security upheavals since 2003 have led this country to be viewed by Türkiye in a threat-centric perspective. Both countries are far from long-term agreements on the flow of the shared watercourses [34-37].

Relations between Iran and Iraq, as riparian states of the two important tributaries of the Tigris River, have fluctuated greatly over several decades between cooperation and alliance, as well as rivalry, dispute, and war. Both states had major disagreements over the demarcation line between them in the Shatt al-Arab waters; both have had a tendency for regional dominance, along with differing ideologies and political orientations. The peak of their conflict was their eight-year-long war, 1980-1988, which is recognized as the longest conventional war of the twentieth century. It

occurred following the Islamic Revolution in Iran in 1979, when the political and regional goals and ambitions of Iran's Ayatollah Khomeini and Iraq's Saddam Hussein clashed. Iraq saw the new regime as a direct threat to itself and its ability to manoeuvre in the Shatt al-Arab waterway, and Hussein believed that the Iranian regime would soon collapse if attacked. The war ended with the death and injury of approximately one million people from both sides, widespread devastation, and economic ruin. The relationship between the two countries has improved significantly since the collapse of Saddam Hussein's regime in 2003. Iraq's many internal security problems and political instability, international sanctions on Iran, and the United States' attempt to isolate Iraq from Iranian influence, along with Iran's sharply rising demand for water, have all meant that both states cannot reach long-term agreements over their shared rivers [38-40].

Part V: Climate change factors

The Middle East is under severe impact from climate change. The average temperature in the region is rising twice the global average, with huge implications for human life and the environment. In 2024, the Middle East experienced the hottest recorded year in its history; temperatures exceeded 50 degrees for many days in several countries, including Iraq. Dust storms are rampant and increasing, especially during the hot seasons, and desertification is expanding across the region. Water is under stress. Reports suggest a reduction of 50% in water per capita in the Gulf Region by 2050. This is disastrous since the region is already water-stressed. Agriculture is in decline as well, as it relies on water. The region increasingly relies on imports for its food needs. Immigration to urban areas and pressure on public health are other areas where climate change makes an appearance [41-43].

Türkiye is believed to be less affected by climate change because of its geographical location. This is far from the truth. Rising temperatures and a decline in annual precipitation are increasingly altering the country's hydrology. It impacts the headwaters of the Tigris and Euphrates. There is a decline in annual rain and snow in eastern Anatolia, and early melting of snow is increasingly noticeable. Snow, as a significant source of both surface and ground water in the eastern and southeastern highlands of Türkiye, is projected to decrease (55%-87%), and surface runoff is expected to decrease (26-57%) by the end of the twenty-first century. This threatens water security in Türkiye. In other words, climate change creates greater uncertainty regarding the availability of freshwater, making long-term agreements a less likely option [44].

Syria suffers from a severe impact of climate change. The most visible impacts are both the rise in temperature and drought, which are intense and devastating for the country. Subsequent years of drought in the past decades have hit the country hard, with devastating impacts on crops, livestock,

agriculture, and rural life, badly affecting over 1.5 million people. The country, and its northeastern region where the Euphrates flows through, suffers from an increasing decline in precipitation, plunging crop production, mainly wheat, and making the country more and more reliant on food imports. Climate change is the driver of desertification and land degradation in Syria. It has led to a rise in diseases and the number of people needing medical care, along with other social problems. The availability of freshwater is a growing problem in many parts of Syria, and the Euphrates is becoming more intermittent, which means that the country lacks reliable and renewable freshwater resources, which, in effect, reduces the chance of a long-term agreement with downstream Iraq [45,46].

Climate change is making a visible presence in Iran. It manifests in rising average temperatures, increased heatwaves, and as a result, an increase in heat-related illnesses, a decline in precipitation (the rainfall in 2024-2025 was just above 100 mm; the standard is 260 mm), a growing freshwater deficit in many areas, including the capital Tehran, the drying up of lakes and reservoirs, agricultural decline, loss of biodiversity, land and environmental degradation, etc. Iran recently witnessed five successive years of drought from 2020 to 2025, which put huge strains on the rapidly declining available freshwater, pushing the Iranian president to suggest that the capital city must be relocated from Tehran, a city of 10 million people, to the south of the country and on the shores of the Persian Gulf, where water can be obtained from desalination. Iran has many dams and tunnels on the tributaries of the Tigris River to collect water and then transfer it to other areas of the country where water is urgently needed for agriculture, regardless of the needs of downstream Iraq [47-54].

Iraq is experiencing the full range of climate change effects. It is among the countries which are most vulnerable to the impact of climate change. The rise in its average temperature is higher than the global average, exceeding 53 degrees in central and southern areas on some days in summer; loss of billions of cubic metres of water to evaporation; a decline in annual rainfall, except for some years such as 2025-2026; the drying up of the marshes in the middle and south, which means the loss of the habitat of water buffalo, fishery, and loss of biodiversity for millions of species, etc.; a decline in crop and fruit production such as oranges and dates; the expansion of desert lands swallowing arable land by 100 square kilometres every year; deforestation; increasing dust and sandstorms; and pressure on public services owing to immigration from rural areas to urban centres, etc. Iraq, as a downstream country desperate for water, is undoubtedly in favour of a permanent and stable flow of the Tigris and Euphrates waters - an ambition that is unattainable for reasons mentioned above [55-58].

Despite the findings of this study, two limitations must be acknowledged. First, primary materials in the form of interviews and data collected from direct field trips were not possible under the current circumstances in Iraq. Second, regarding the political aspect of the problem, apart from realism as a school of thought, other IR theories can be important for understanding the situation and also finding solutions. Nevertheless, this focused approach allows for a deep understanding of the nature of the problem. Future studies should consider using primary materials and examining the issue with other perspectives.

Conclusion

There has never been a war between Türkiye and Syria over the Euphrates waters, Syria and Iraq over the Euphrates waters, Türkiye and Iraq over the Tigris waters, or between Iran and Iraq over the tributaries of the Tigris waters; but there also has never been long-term cooperation and agreements over the flow of these rivers between these states. All riparian states of the Tigris and Euphrates have growing needs for water, but the sources that feed the rivers are under the increasing effects of climate change. Average annual precipitation is generally declining in all the Tigris and Euphrates basin countries.

Climate change makes grand and enduring cooperation between these states difficult, as it creates huge fluctuations in the annual flow of rivers and uncertainties for the future allotment of water to the states. The unlimited power that modern states exercise under the guise of sovereignty and the freedom they have over the management of their internal affairs, including the international watercourses flowing within their territories, along with the political tensions between them, creates problems for long-standing agreements and cooperation between the Tigris and Euphrates riparian states.

States in the Tigris-Euphrates basin have different preferences and abilities, and they feel the imperatives of climate change differently; hence, they have varying approaches to the shared waters. The historical rights of downstream Iraq and Syria, along with their desperate need for water, cannot be disregarded. On the other hand, upstream Türkiye and Iran do not publicly deny the rights of downstream states to water. Nevertheless, ideological differences, political orientations, and a bitter history of conflict and rivalries make these states unwilling to enter into long-term and multilateral agreements. Therefore, we propose coordination and short-term annual solutions.

Coordination is defined as ‘a process in which two sides learn to work with one another to forge commitments to cooperate with new rules of agreement.’ It is described as less regularized than cooperation, occurring in small and practical steps based on a common understanding.

Coordination is also less prone to politicization [59]. Despite political tensions and security threats, the four riparian states do trade and conduct business with each other on a large scale. They are interdependent on one another to a great extent for manufactured and agricultural products, as well as energy [60]. These countries are not going to abandon each other. Therefore, we suggest that Türkiye and Iraq over the Tigris River, Iran and Iraq over the tributaries of the Tigris, Türkiye and Syria over the Euphrates, and Syria and Iraq over the Euphrates can bilaterally coordinate with one another to develop short-term solutions regarding the flow of the waters.

References

- [1] Morozova, G. S., 2005, A review of Holocene avulsions of the Tigris and Euphrates rivers and possible effects on the evolution of civilizations in lower Mesopotamia. *Geoarchaeology*, **20**, 401-423. www.doi.org/10.1002/gea.20057
- [2] Al-Ansari, N., Adamo, N., & Sissakian, V., 2019, Hydrological characteristics of the Tigris and Euphrates Rivers. *Journal of Earth Sciences and Geotechnical Engineering* 9(4), 1-26. www.doi.org/10.4236/eng.2016.83015
- [3] Al-Ansari, N., Aljawad, S., Adamo, N., & Sissakian, V. K., 2018, Water quality within the Tigris and Euphrates catchments. *Journal of Earth Sciences and Geotechnical Engineering* **8**(3), 95-121. https://urn.kb.se/resolve?urn=urn%3Anbn%3Ase%3Alt%3Adiva-68447&utm_source=chatgpt.com
- [4] Issa, I., Al-Ansari, N., Sherwany, G., & Knutsson, S., 2014, Expected Future of Water Resources within Tigris-Euphrates Rivers Basin, Iraq. *Journal of Water Resource and Protection* **6**, 421-432. www.doi.org/10.4236/jwarp.2014.65042
- [5] Al-Murib, M., & Wells, S., 2016, Application of CE-QUAL-W2 on the Tigris River in Iraq. *World Environmental and Water Resources Congress 2016*, 531–540. www.doi.org/10.1061/9780784479858.052
- [6] Bilen, Ö., 1994, Prospects for technical cooperation in the Euphrates–Tigris Basin. In Biswas, A. K. (Ed.), *International waters of the Middle East: From Euphrates-Tigris to Nile* (pp. 95–116). (Oxford: Oxford University Press).
- [7] Hydropolitics Academy – Türkiye, Who Controls Syria’s Dams on the Euphrates River: An Overview, 2024, <https://hidropolitikakademi.org/tr/article/31076/who-controls-syrias-dams-on-the-euphrates-river-an-overview> (accessed 28 March 2026).
- [8] Save the Tigris, 2021, *Water transfer projects threaten the Lesser Zab!* (2021, March 5). <https://savethetigris.org/water-transfer-projects-threaten-the-lesser-zab/> (accessed 28 March 2026).
- [9] Abbas, N., Wasimi, S. A., & Al-Ansari, N., 2017, Impacts of climate change on water resources of Greater Zab and Lesser Zab basins, Iraq, using Soil and Water Assessment Tool model. *International Journal of Environmental, Chemical, Ecological, Geological and Geophysical Engineering* **11**(10), 931–937. www.doi.org/10.5281/zenodo.1132717
- [10] Sarhat, A. R., 2022, Iranian Tropical Water Project on Sirwan River and its impacts on some environmental aspects in Garmian Region. *Journal of Garmian University* **9**(Special Issue 1), 272–287. www.doi.org/10.24271/jgu.2022.149172

- [11] Faraj, D. M., & Zaidan, K., 2022, The impact of the Tropical Water Project on Darbandikhan Dam and Diyala River Basin. *Iraqi Journal of Civil Engineering* **14**(1), 1–6. www.doi.org/10.37650/ijce.2020.172869
- [12] Iraqi Civil Society Solidarity Initiative, 2016, *New report highlights the disastrous impact of Daryan Dam on Iraq*, 2016, (Baghdad: Iraqi Civil Society Solidarity Initiative). (2016, October 28). <https://www.iraqicivilsociety.org/archives/5994> (accessed 29 March 2026).
- [13] Al-Aloosy, M., 2021, *Iraq's water crisis: An existential but unheeded threat*. Washington, DC: Arab Gulf States Institute in Washington (AGSIW) (2021, August 27). <https://agsi.org/analysis/iraqs-water-crisis-an-existential-but-unheeded-threat/> (accessed 29 March 2026).
- [14] Gross, L., 1948, The Peace of Westphalia, 1648–1948. *American Journal of International Law* **42**(1), 20–41. www.doi.org/10.2307/2193560
- [15] Croxton, D., 1999, The Peace of Westphalia of 1648 and the Origins of Sovereignty. *The International History Review* **21**(3), 569–591. www.doi.org/10.1080/07075332.1999.9640869
- [16] United Nations Dag Hammarskjöld Library, n.d., *UN membership*. (New York: United Nations). <https://research.un.org/en/unmembers/currentmembers> (accessed 30 March 2026).
- [17] Waltz, K. N., 1959, *Man, the state, and war: A theoretical analysis*. (New York: Columbia University Press).
- [18] Sørensen, G., Møller, J., & Jackson, R. H., 2022, *Introduction to international relations: Theories and approaches*. (Oxford: Oxford University Press)
- [19] Morgenthau, H. J., 1949, *Politics among nations: The struggle for power and peace*. (New York: Alfred A. Knopf) [http://slantchev.ucsd.edu/courses/ps240/04%20Conflict%20with%20States%20as%20Unitary%20Actors/Morgenthau%20-%20Politics%20among%20nations%20\(selected%20chapters\).pdf](http://slantchev.ucsd.edu/courses/ps240/04%20Conflict%20with%20States%20as%20Unitary%20Actors/Morgenthau%20-%20Politics%20among%20nations%20(selected%20chapters).pdf)
- [20] Machiavelli, N., 2014, *The prince* (T. Parks, Trans.). (London: Penguin Classics). <https://apeiron.iulm.it/retrieve/handle/10808/4129/46589/Machiavelli%2C%20The%20Prince.pdf>
- [21] Abdulrahman, S. A., 2019, The River Nile and Ethiopia's Grand Renaissance Dam: challenges to Egypt's security approach. *International Journal of Environmental Studies* **76**(1), 136–149. www.doi.org/10.1080/00207233.2018.1509564
- [22] United Nations, 1997, *Convention on the law of the non-navigational uses of international watercourses*. (New York: United Nations). <https://doi.org/10.18356/3565f643-en> (accessed (30 March 2026).
- [23] Kibaroglu, A., 2015, An analysis of Turkey's water diplomacy and its evolving position vis-à-vis international water law. *Water International* **40**(1), 153–167. www.doi.org/10.1080/02508060.2014.978971
- [24] Dellapenna, J. W., & Bidabadi, F. S., 2024, Iran's approach to transboundary watercourses under international law. *Journal of Water Law* **28**(5), 147–167.
- [25] Mearsheimer, J. J., 2014, *The tragedy of great power politics*. (New York: W. W. Norton & Company).
- [26] Grieco, J. M., 1988, Anarchy and the limits of cooperation: A realist critique of the newest liberal institutionalism. *International Organization* **42**(3), 485–507. www.doi.org/10.1017/S0020818300027715

- [27] Aburish, S. K., 1998, *A brutal friendship: The West and the Arab elite*. (St. Martin's Press).
- [28] Gerges, F. A., 2025, *The great betrayal: The struggle for freedom and democracy in the Middle East*. (Princeton, NJ: Princeton University Press).
- [29] Kayihan, B., Şenyüz, B., Şahin, F. K., & Uğurlu, N. B., 2025, Tracing the conflict between Türkiye and Syria through the Turkish mainstream media's coverage of the Syrian President Bashar al-Assad. *Sociological Inquiry* 95(3), 562–587. <https://doi.org/10.1111/soin.12632>
- [30] Şeyşane, V., & Çelik, Ç., 2023, Rethinking Turkey's approach to R2P: Turkish foreign policy towards the Syrian civil war 2011–2017. In A. Reichwein & M. Hansel (Eds), *Rethinking the responsibility to protect* (Contributions to International Relations). (Cham : Springer). https://doi.org/10.1007/978-3-031-27412-1_8
- [31] Erkmen, S. A., & Erendor, M. E. (Eds)., 2024, *The security dimensions of the Syrian civil war: The case of Türkiye*. (Boca Raton: CRC Press). <https://doi.org/10.1201/9781003461111>
- [32] Dukhan, H., 2025, Winds of Change: Iraq and Syria in the Aftermath of Assad. *The Arab Centre for Contemporary Syria Studies*. <https://www.harmoon.org/en/researches/iraq-and-syria/> (accessed 30 March 2026).
- [33] Moubayed, S., 2023, This day in history: The Ba'ath Party comes to power in Syria. *Al Majalla*. <https://en.majalla.com/node/287416/documents-memoirs/day-history-ba%E2%80%99ath-party-comes-power-syria> (accessed 30 March 2026).
- [34] Tanrıverdi Yaşar, N., 2025, *From frontline to central regional node: Turkey's recalibration of its regional strategy in Iraq* (SWP Comment 2025/C 43). (Berlin: Stiftung Wissenschaft und Politik – German Institute for International and Security Affairs). <https://doi.org/10.18449/2025C43>
- [35] Refaat, A. S., 2025, Turkey's water policy towards Iraq since 2011 and its future prospects. *Political Issues* 80, 58–76. www.doi.org/10.58298/802025687
- [36] Göçer D., & Altunışık, M., 2025, Türkiye–Iraq Relations: Opportunities and Tensions in Security and Connectivity. *Panorama*. <https://www.globalpanorama.org/en/2025/12/turkiye-iraq-relations-opportunities-and-tensions-in-security-and-connectivity-derya-gocer-meliha-altunisik/> (accessed 30 March 2026).
- [37] Islam, N., 2020, Review of *Rethinking Turkey-Iraq relations: The dilemma of partial cooperation*, by M. A. Kumral. *Insight Turkey* 22(1), 257–260. (New York: Palgrave Macmillan). <https://www.insightturkey.com/file/1233/rethinking-turkey-iraq-relations-the-dilemma-of-partial-cooperation>
- [38] Kostiner, J., 2009, The Iran-Iraq war. In *Conflict and cooperation in the Gulf region* (pp. 24–77). (Wiesbaden: VS Verlag für Sozialwissenschaften). https://doi.org/10.1007/978-3-531-91337-7_2
- [39] Bakhash, S., 2004, The troubled relationship: Iran and Iraq, 1930–80. In L. G. Potter & G. G. Sick (Eds), *Iran, Iraq, and the legacies of war*. (New York: Palgrave Macmillan). https://doi.org/10.1057/9781403980427_2
- [40] Sohrabi, N., 2019, Remembering the Palestine Group: global activism, friendship, and the Iranian revolution. *International Journal of Middle East Studies* 51(2), 281–300. www.doi.org/10.1017/S0020743819000059
- [41] Malik, A., Stenchikov, G., Mostamandi, S., Parajuli, S., Lelieveld, J., Zittis, G., Ahsan, M. S., Atique, L., & Usman, M., 2024, Accelerated historical and future warming in the Middle

- East and North Africa. *Journal of Geophysical Research: Atmospheres* **129**(22), e2024JD041625. <https://doi.org/10.1029/2024JD041625>
- [42] World Meteorological Organization (WMO), United Nations Economic and Social Commission for Western Asia (UN-ESCWA), & League of Arab States, 2025, State of the Climate in the Arab Region 2024. (Geneva: World Meteorological Organization). <https://www.preventionweb.net/publication/documents-and-publications/state-climate-arab-region-2024> (accessed 31 March 2026).
- [43] Waha, K., Krummenauer, L., Adams, S., Aich, V., Baarsch, F., Coumou, D., Fader, M., Hoff, H., Jobbins, G., Marcus, R., Mengel, M., Otto, I. M., Perrette, M., Rocha, M., Robinson, A., Schleussner, C.-F., & Thonicke, K., 2017, Climate change impacts in the Middle East and Northern Africa (MENA) region and their implications for vulnerable population groups. *Regional Environmental Change* **17**(6), 1623–1638. www.doi.org/10.1007/s10113-017-1144-2
- [44] Bozkurt, D., & Sen, O. L., 2013, Climate change impacts in the Euphrates–Tigris Basin based on different model and scenario simulations. *Journal of Hydrology* **480**, 149–161. www.doi.org/10.1016/j.jhydrol.2012.12.021
- [45] United Nations Office for the Coordination of Humanitarian Affairs OCHA, 2023, Syria: Facing the dual challenge of climate change and conflict. <https://www.unocha.org/news/syria-facing-dual-challenge-climate-change-and-conflict> (accessed 31 March 2026).
- [46] Fraser Baxter, S., & Ross, P., 2023, Climate change to blame for the devastating drought in Syria, Iraq and Iran. *Imperial*. <https://www.imperial.ac.uk/news/249415/climate-change-blame-devastating-drought-syria/> (accessed 31 March 2026).
- [47] Abdulrahman, S. A., 2017, Failure to securitise environmental problems in Iraq: the case of the Alwand and Sirwan Rivers. *International Journal of Environmental Studies* **74**(4), 540–557. www.doi.org/10.1080/00207233.2017.1330493
- [48] Mansouri Daneshvar, M. R., Ebrahimi, M., & Nejadsoleymani, H., 2019, An overview of climate change in Iran: Facts and statistics. *Environmental Systems Research* **8**(7). www.doi.org/10.1186/s40068-019-0135-3
- [49] Nasirian, H., & Naddafi, K., 2025, A new perspective on climate change in the geography of Iran: Current and potential future implications. *Journal of Environmental Health Science and Engineering* **23**(25). www.doi.org/10.1007/s40201-025-00948-y
- [50] Abbaspour, K. C., Faramarzi, M., Ghasemi, S. S., & Yang, H., 2009, Assessing the impact of climate change on water resources in Iran. *Water Resources Research* **45**(10), Article W10434. www.doi.org/10.1029/2008WR007615
- [51] Mohammadi, N. M., Khanjani, N., Bakhtiari, B., & Jahani, Y., 2024, The impact of drought and climate change on economy, environment and human health in Southern Iran: A qualitative study. *International Journal of Disaster Risk Reduction* **114**, Article 104937. www.doi.org/10.1016/j.ijdr.2024.104937
- [52] Climate Rights International, 2025, Iran: Climate-Driven Drought and Decades of Mismanagement Leave Tehran at Risk. <https://cri.org/iran-climate-driven-drought-decades-mismanagement-leave-tehran-risk/> (accessed 31 March 2026).
- [53] Wintour, P., 2025, *Iran must move its capital from Tehran, says president as water crisis worsens*. The Guardian (October 2, 2025), <https://www.theguardian.com/world/2025/oct/02/iran-must-move-its-capital-from-tehran-says-president-as-water-crisis-worsens> (accessed 31 March 2026).

-
- [54] World Weather Attribution, 2025, Human-induced climate change compounded by socio-economic water stressors increased severity of 5-year drought in Iran and Euphrates and Tigris basin. <https://www.worldweatherattribution.org/human-induced-climate-change-compounded-by-socio-economic-water-stressors-increased-severity-of-5-year-drought-in-iran-and-euphrates-and-tigris-basin/> (accessed 31 March 2026).
- [55] Abdulrahman, S. A., 2025, Iraq's Desertification: The Complication of Environmental Security Issues. *Natural Built Social Environment Health* 1(1), 83–103. www.doi.org/10.63095/NBSEH.25.720252
- [56] Abdulrahman, S. A., 2025, Dust Storms Batter Iraq: A New Environmental Security Challenge. *Natural Built Social Environment Health* 1(4), 159–171. www.doi.org/10.63095/NBSEH.25.145579
- [57] Ali, S. H., Qubaa, A. R., & Al-Khayat, A. B. M., 2024, Climate change and its potential impacts on Iraqi environment: Overview. *IOP Conference Series: Earth and Environmental Science* 1300(1). www.doi.org/10.1088/1755-1315/1300/1/012010
- [58] International Organization for Migration (IOM), 2022, *Migration, environment, and climate change in Iraq*. (Baghdad: International Organization for Migration). <https://iraq.un.org/en/194355-migration-environment-and-climate-change-iraq> (accessed 31 March 2026).
- [59] Abdulrahman, S. A., 2025, Nile Basin Politics: From Coordination to Cooperation, edited by Steven C. Roach, Derrick K. Hudson, and Kaleb Demerew, Cheltenham, Edward Elgar Publishing, 2025, 180 pp., £90 (hardback), ISBN: 978-1-80392-716-9; eISBN: 978-1-80392-717-6. *Natural Built Social Environment Health* 1(2), 168–174. www.doi.org/10.63095/NBSEH.25.854092
- [60] Jackson, R., & Sørensen, G., 2007, *Introduction to international relations: Theories and approaches* (3rd ed.). (Oxford: Oxford University Press), pp. 97–128.